

## EXP-2

### Aim

To determine resistance per unit length of a given wire by plotting a graph of potential difference versus current

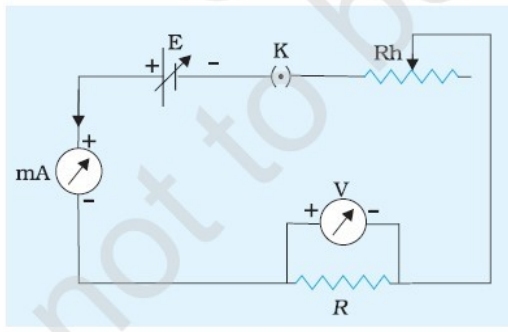
### APPARATUS AND MATERIAL REQUIRED

A wire of unknown resistance, battery eliminator, voltmeter, milliammeter (0 – 500 mA), rheostat, plug key, Connecting wires and a piece of sand paper.

### PRINCIPLE

Ohm's law states that the electric current flowing through a conductor is directly proportional to the potential difference across its ends, provided the physical state of the conductor remains unchanged. i.e.,  $V = IR$

A linear relationship is obtained between  $V$  and  $I$ , i.e. the graph between  $V$  and  $I$  will be a straight line passing through the origin. The slope of the graph is  $1/R$  (Equation of straight line passing through origin is  $y = mx$  where  $m$  is the slope of graph).



### PROCEDURE

1. Connect various components - resistance, rheostat, battery, key, voltmeter and ammeter as shown in Fig.
2. Note the range and least count of the given voltmeter and milliammeter.
3. Insert the key  $K$  and slide the rheostat contact to one of its extreme ends, so that current passing through the resistance wire is minimum.
4. Note the milliammeter and voltmeter readings.
5. Remove the key  $K$  and allow the wire to cool, if heated. Again insert the key. Shift the rheostat contact slightly to

increase the applied voltage. Note the milliammeter and voltmeter reading.

### OBSERVATIONS

1. Range of ammeter = ... mA to ...mA
2. Least count of ammeter = ... mA
3. Range of voltmeter = ... V to ...V
4. Least count of voltmeter = ...V
5. Least count of metre scale = ... m
6. Length of the given wire,  $l = ...m$

S.NO	VOLTMETER READING (V) Volt	CURRENT (I) mA

### CALCULATIONS

- 1.. The resistance of the given wire is equal to the reciprocal of the slope.  
From the graph  $R =$
3. Resistance per unit length of given wire  $= \frac{R}{l} = \dots \dots \text{ohm/m}$

### RESULT

1. The potential difference across the given wire varies linearly with the current.
2. The resistance per unit length of the wire is = .....ohm/m

### PRECAUTIONS

1. The voltmeter should be connected in parallel and the ammeter in series with the circuit. It should be ensured that current enters at the positive terminal and leaves at the negative terminal.
2. The key should be inserted only while taking observations, as excessive flow of current causes unnecessary heating of the wire.